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**Testimony of Dennis L. Duffield, P.E before the Illinois
Emergency Management Agency at Oglesby, Illinois
Wednesday October 27, 2010**

My name is Dennis Duffield. I am a project manager for Rogina and Associates, Consulting Engineers, located at 93 Caterpillar Drive in Joliet, Illinois. I represent the City of Joliet and an informal group of stakeholders that will be impacted by this proposed rulemaking.

STAKEHOLDERS GROUP

A group of stakeholders met in Dekalb on September 28, 2010 at the invitation of the Village of Chamnahon, City of Geneva, City of Joliet and Dekalb Sanitary District. At the meeting, it was proposed that the stakeholders work as a group to obtain a rule that is protective of the public health at a reasonable cost. The purpose of the meeting was to develop a consensus that would serve as a guide in ongoing efforts to obtain a rule that is protective of the public health at a reasonable cost.

At the meeting, questions concerning the land application program were posed to the group. The consensus of the group was that land application must be regulated with minimal reporting. IEMA should work with IEPA to incorporate the reporting into the current land application program and develop an method to share information.

The number of stakeholders is not fully known. IEPA continues to add a 0.4 picocurie per gram increase to land application permit as the permits are renewed. Additional plants receive the limitation each month. Thus more and more communities become aware of the issue and some chose to join the stakeholder group.

Stakeholders with high concentrations of combined radium are concerned about the proposed requirement that IEMA staff apply their discretion on a case-by-case basis. Without specific requirements in the rule, it is not possible to make a disposal plan that will be consistent over the years. Changes may occur with each permit renewal as personnel or ideas change at IEMA. The needed consistency is not assured under a discretionary program.

The stakeholders were unable to complete their organization, because the notice of this meeting was issued while the organization was in progress. The original intent of the stakeholders was to work with IEMA to develop an alternate rulemaking proposal meeting the objectives outlined by the Joint Committee on Administrative Rules (Joint Committee).

A proposal jointly prepared by IEMA and the stakeholders would significantly simplify the public hearings required in the rulemaking process.

LOCATION

I am glad that this meeting is being held in Oglesby today. This location is about 5 miles from Interstate 80 which has historically been the south boundary of radium issues in Illinois.

COSTS

My review of the notice issued for this meeting indicated that IEMA is most concerned with gathering cost data. While costs were mentioned in the Joint Committee's request, the stakeholders (because of the short notice period provided and the amount of time needed) can only provide general information and/or responses to questions regarding costs; and will attempt to show that cost considerations are not necessary by demonstrating that the existing land application is protective of the public health.

The stakeholders have arranged for Eli Port, certified health physicist and Dr. Ken Mossman, nationally recognized health physicist to address the health issues.

I will provide limited information concerning the cost questions that were asked in the notice

Radium Capture at Water Treatment Plants-

In the limited time available since the meeting notice was published, I investigated the collection of radium from the backwash of plants that use co-precipitation of radium with hydrous manganese oxide (HMO).

Decant/Filter backwash

In these plants, pre-formed hydrous manganese oxide is added to the raw water and forms a floc. The radium attaches to the HMO particle which is filtered from the water with a standard sand filter. The backwash from this process disposes of the radium to the sanitary sewer. The radium in the backwash combines with domestic sewage and is transported to the wastewater treatment plant for removal along with other solids. Radium is removed with the solids. After stabilization, the solids are land applied to agricultural land along with the radium.

In the water plant I studied, radium from 3,000,000 gallons of water is removed by the filter. This radium is retained in the 210,000 gallons of water that is used in the backwash problem. In theory by decanting and filtering to separate the liquid fraction of this

210,000 gallons, the volume can be reduced 95-99%. If you use 99% reduction, you have all the radium in 2100 gallons of water. The disposal of this material at a landfill using █████ per ton for transportation (1600 tons) and █████ per load tipping fee (58 loads) has an annual cost of \$█████ per site. For six sites, the annual cost is approximately █████ per year. Each site will require █████ in modifications to separation facilities and storage. The 20 year present worth is approximately █████ at 4% interest. This cost does not eliminate the land application program with the ongoing expenses. Based on the information prepared by Eli Port, CHP and Dr. Mossman, an expenditure of this magnitude is not justified to eliminate the associated radiation dose.

DOWEX RADIUM SELECT COMPLEXER RESIN

The water treatment plants in Joliet were designed for conversion to DOWEX Radium Select Complexer Resin if regulations changed in the future and prohibited discharge of backwash water to the sanitary sewer.

The pressure filters in the plants were designed as two separate pressure chambers. This design allows the current operation where all flow from the well enters the top of the vessel, travels through filter media, and exits to the water distribution system. In the radium capture mode, all flow would enter one of the two pressure chambers. The water would flow through the specialized media and exit the chamber. Flow from the exit of this chamber would be directed to the top of the second chamber and flow through the media in that chamber to the distribution system. The radium is captured by the media in the first chamber and the second chamber provides reliability.

The cost of conversion of the 23 pressure vessels in the Joliet system is estimated at \$10,000,000.

Piping modification materials per vessel	\$ 30,000
Labor 320 manhours @\$100 per vessel	32,000
Dowex per vessel	<u>250,000</u>
Subtotal (per vessel)	\$ 312,000
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Subtotal	\$7,176,000
25 % contingency	1,794,000
15% engineering and legal	<u>1,076,400</u>
Total	\$ 10,046,400
Use	\$ 10,000,000

The media is expected to reach capacity on an average of every two years. Based on the average daily usage, the media in 20 filters would have to be replaced every two years. This is an annual expense of \$2,500,000 (20/2 times \$250,000) for media only. The 20 year present value of the initial conversion and 20 years of media replacement is approximately \$42,000,000.

Additional expenses include the labor to exchange the media in the vessel, the transportation of the media to a radioactive waste disposal site out of state and the disposal charge and the continuing debt service on the construction of the HMO plants.

Since the \$42,000,000 is in the same range as the landfill disposal costs previously presented, this is not a cost effective alternative. The cost is not justified by the dose reduction that results from this treatment method.

Other Alternatives

Radon is major cause of lung cancer and naturally occurs in Illinois. From a public health standpoint, increased use of radon detectors and mitigation of problems discovered will have greater impact than regulation of land application of sludge. The radon detectors will find radon on land that has not received sludge applications. Mitigation will reduce the potential for lung cancer from radon.

Costs of Proposed Rule

Joliet has previously provided costs for compliance with the proposed rule. These costs are in the record.

Measurement of Radium Levels in Fields

No field measurements were obtained in response to the information provided in the notice for this meeting. The reasons that samples were not collected are as follows:

1. Sampling would not demonstrate or rule out public health impact
The extremely low doses that are created by land application of sludge are well below the ability to determine any health impact. Mr. Port and Dr. Mossman have provided information concerning the health impacts today.
2. Common Sense
There was insufficient time between the receipt of the meeting notice and the meeting to collect samples, transport them to the laboratory, have the samples analyzed and the results reported. The meeting notice stated that the record of this proceeding closes at 5:00 p.m. today. There was no opportunity to collect samples and have the results included in the record.
3. If sample results were available, there is no information on the interpretation of the results. What radium concentration in soil represents that there is no public health hazard? Essentially, that question is the reason this meeting is being held today. Collecting field data without an understanding of the value of the data is wasting money

I looked for field data from others. If found measurements of background radiation in approximately 20 states on the internet. There were 4 measurements in Illinois and all were in the range of 3.1 picocuries per gram. I have no idea what this means.

I looked for data in Wisconsin because the land application rules there require field measurements in order to continue to apply to land that has received applications calculated to be 0.92 pico-curies per gram. In discussions with a representative of Wisconsin Department of Natural Resources, consulting engineers and plant operators, I was unable to find any location that has field tested.

Other Issues

Sludge Concentration

One issue that was brought up at the stakeholders meeting concerns the concentration of radium in sludge. More than 3 communities have combined radium 226 and radium 228 concentrations in the range of 90-140 pico-curies per gram. The proposed regulation limits disposal methods for sludge based on radium concentration. It also regulates the resulting concentration in soil after application. Since the impact to the public is the result of the concentration in soil, the limitations on sludge concentration are not needed for protection of the public.

Wisconsin Approach

In a telephone conference preparing for this meeting, IEMA asked if the total Wisconsin approach was acceptable to Joliet. Since there is not a detailed description of the Wisconsin regulation in the record, I refer you to the Wisconsin Administrative Code Chapter NR204.07 (3)(n) 5,6,7. I have included these items in my written presentation

5. Sludge containing radium-226 may not be applied to fields used for the production of tobacco.

6. Application of radium-226 sludge shall be terminated when the calculated site loading reaches 1640 microcuries per acre. To continue site use, the permittee shall sample soils according to a plan approved by department, and show that soil radium-226 activity is below 2 pCi/g in the top foot of soil.

Note: 1 microcurie = 10^{-6} curies, 1 picocurie = 10^{-12} curies

7. If plant tissue sampling for radium-226 is required by the department in the permit, it shall be done in accordance with a department approved method. The number of plant tissue samples obtained shall be identical to the number of subsamples needed to constitute a composite soil sample and shall yield a wet weight of approximately 4 pounds. The entire above ground plant shall be obtained as near as possible to the soil subsample site. Plant samples shall then be segregated between the above ground tissue, such as stems, stalks, petioles or leaves, and the "edible" portion, such as fruit, grain or seed.

The key point in the Wisconsin regulations is that the only isotope of radium that is regulated is radium 226. I have been unable to find anyone in Wisconsin who participated in the rulemaking and can explain the intent. I would expect that it is a result of the radon 222 appearing in the uranium series with radium 226.

By my calculations using 90 lbs per cubic foot unit weight of soil, 1640 microcuries per acre converts to 0.92 pico-curies per gram. The 0.92 pico-curies per gram is very close to the 1.0 pico-curies per gram previously proposed by Joliet.

No limitation on the concentration of radium in sludge is included in the Wisconsin rules, only the calculated loading to a field is regulated.

After calculated loadings are met, no additional sludge can be applied with field sampling and the submission of plan to demonstrate that the radium in the soil will not exceed 2 pico-curies per gram. I have not been able to find any information that indicates that any community in Wisconsin has sampled fields in order to continue sludge application.

In my investigation, I talked with representatives of the Waukesha wastewater treatment plant. The representative stated that the controlling constituent in sludge that determined the number of applications to a field was phosphorus, not radium.

I also reviewed the make up of the combined radium 226 and 228 from Illinois plants. In many plants, the split between radium 226 and radium 228 is 50/50. With the Radium 226 excluded, additional applications would be possible

My answer to the question is the Wisconsin approach acceptable is "maybe". I need to spend more time reviewing the implementation. I was not able to obtain any reporting

documents or discuss operations with multiple wastewater plants in the short period of time available. I didn't make contact with the operations personnel until Tuesday, so I have not had time to properly evaluate the information and distribute the information to all that attended the Dekalb meeting. I will complete the evaluation in IEMA and the stakeholders believe the additional effort is justified by an interest in proposing the Wisconsin approach in lieu of the current proposal.

I am available for questions.

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Not submitted

*Since Mr Klebe
state that none has
done this, I
would
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that my
client
be the
first
to study
so I am
not present*

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